Vol. V MARCH, 1911 No. 3

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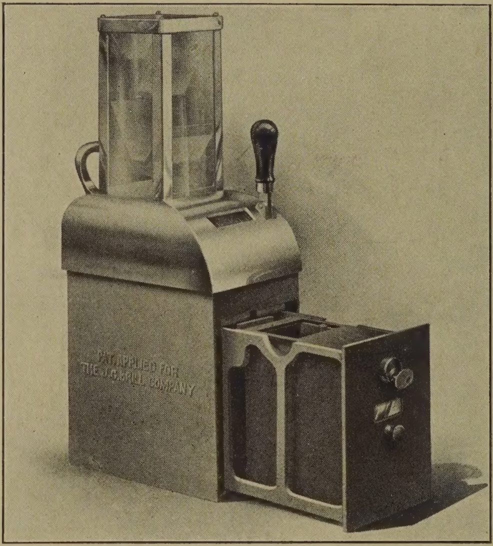
BRILL MAGAZINE

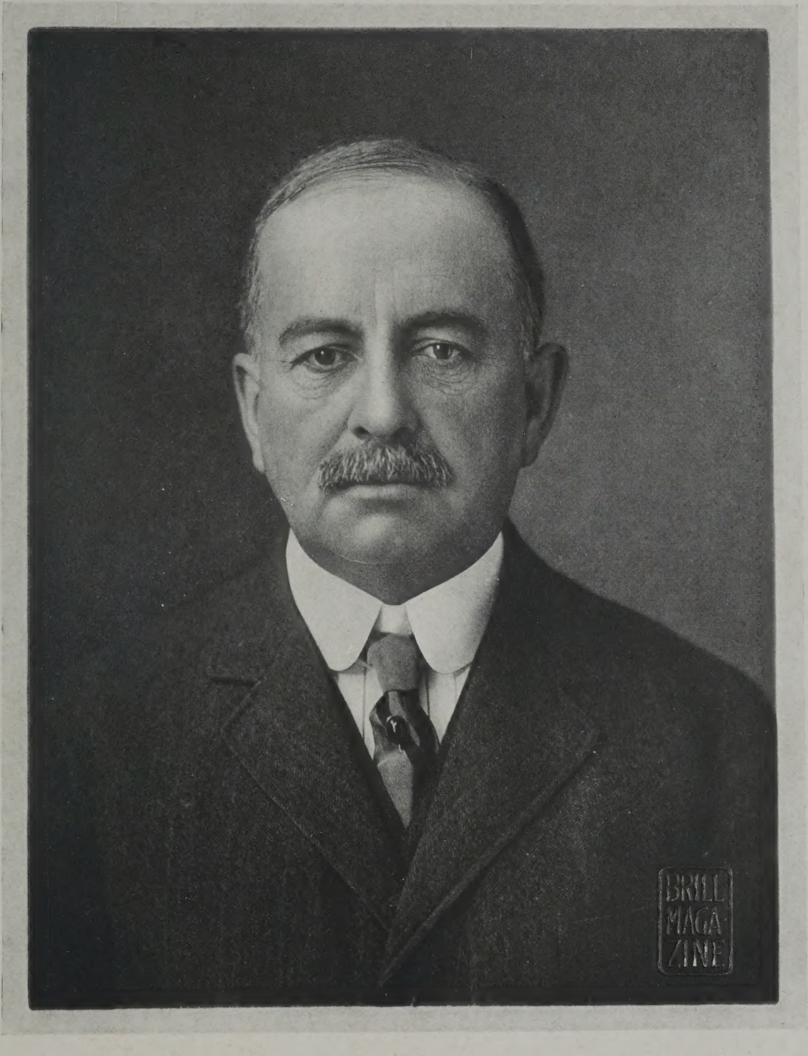
San Juan de Letrán
Mexico City



BRILL FARE BOX NO. 4

Thirty-two different railways are using this portable box. It is a ticket as well as a coin collector and is made with and without totalizer. The drawer holding the cash till can only be drawn out, after it is unlocked, by pulling back the handle which operates the tilting plate—no fares can be left in the receiver. Pulling out the drawer automatically and positively locks the cash till. Turning upside down locks tilting plate. Height, 20½ ins.; weight, 35 lbs.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



C. S. Sergeant

Vice-President, Boston Elevated Railway Company

SUPPLEMENT TO BRILL MAGAZINE
MARCH, 1911

BRILL MAGAZINE

Vol. V MARCH, 1911 No. 3

CHARLES S. SERGEANT

[WITH PORTRAIT INSERT]

CHARLES S. SERGEANT, vice-president of the Boston Elevated Railway Company, was born in Northampton, Mass., in 1852. After graduating from the Northampton High School at the age of 16, he began business in the First National Bank of Easthampton, Mass., where he remained four years; then, going to Marquette (Lake Superior), Mich., he began his railroad experience and remained there in railroad work and iron smelting until 1876, when he removed to Boston to enter the service of the Eastern Railroad, of which he soon became general auditor, and after seven years of service became associated with the fiscal agency in Boston of the group of western railroads known as the Thayer Merriam roads. In 1888 he entered the street railway business as general auditor of the West End Street Railway Company, which had then been formed by consolidation of all the Boston street railways. He served successively as general auditor, second vice-president and general manager of that company, and upon its lease in 1897 to the Boston Elevated Railway Company he was appointed successively to the offices of second vice-president and vice-president of that company, having charge of the Bureau of Operation. In his experience with the Boston street railway system, Mr. Sergeant has seen the development of a surface horse railway, transporting in 1888 about 96,337,000 revenue passengers, into a combined system of surface, overhead and underground traction which was last year called upon to transport 296,165,915 revenue passengers.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

MEXICO CITY*

MEXICO CITY, besides being the capital of the Mexican Republic, is its metropolis and commercial center. It has a population of about 600,000 people, and the Federal District, not including the city, has about 300,000 more, making a total of 900,000 people who are served by the street railway system of the Mexico Tramways Company. The Federal District corresponds more or less to the District of Columbia, in the United States, as it contains the capital of the Mexican Republic. Its chief official is the Governor of the Federal District, but he is independent of the Governor of the State of Mexico, within which the Federal District is located. Mexico City, although situated in the tropical zone, on account of its elevation of 7,500 feet above the sea level, has a temperate climate, with no excessive heat, and at night a very cool temperature, usually about 50° Fahr., and in the winter season as low as 30° Fahr.

The population includes a large percentage of foreigners, among whom Americans constitute the largest colony. Many of the principal commercial, mining and engineering enterprises are conducted by foreigners, and chiefly by Americans. The chief industries of the state are in the cotton mills, tobacco factories, grist mills, machine shops, foundries, and the usual industries of a large city.

Mexico City, as it is to-day, is one of the finest and most impressive on the American Continent, as it combines many fine buildings of old Spanish architecture and the most modern buildings of fireproof construction. Among the former are the famous Cathedral, the President's Palace, the Munic-

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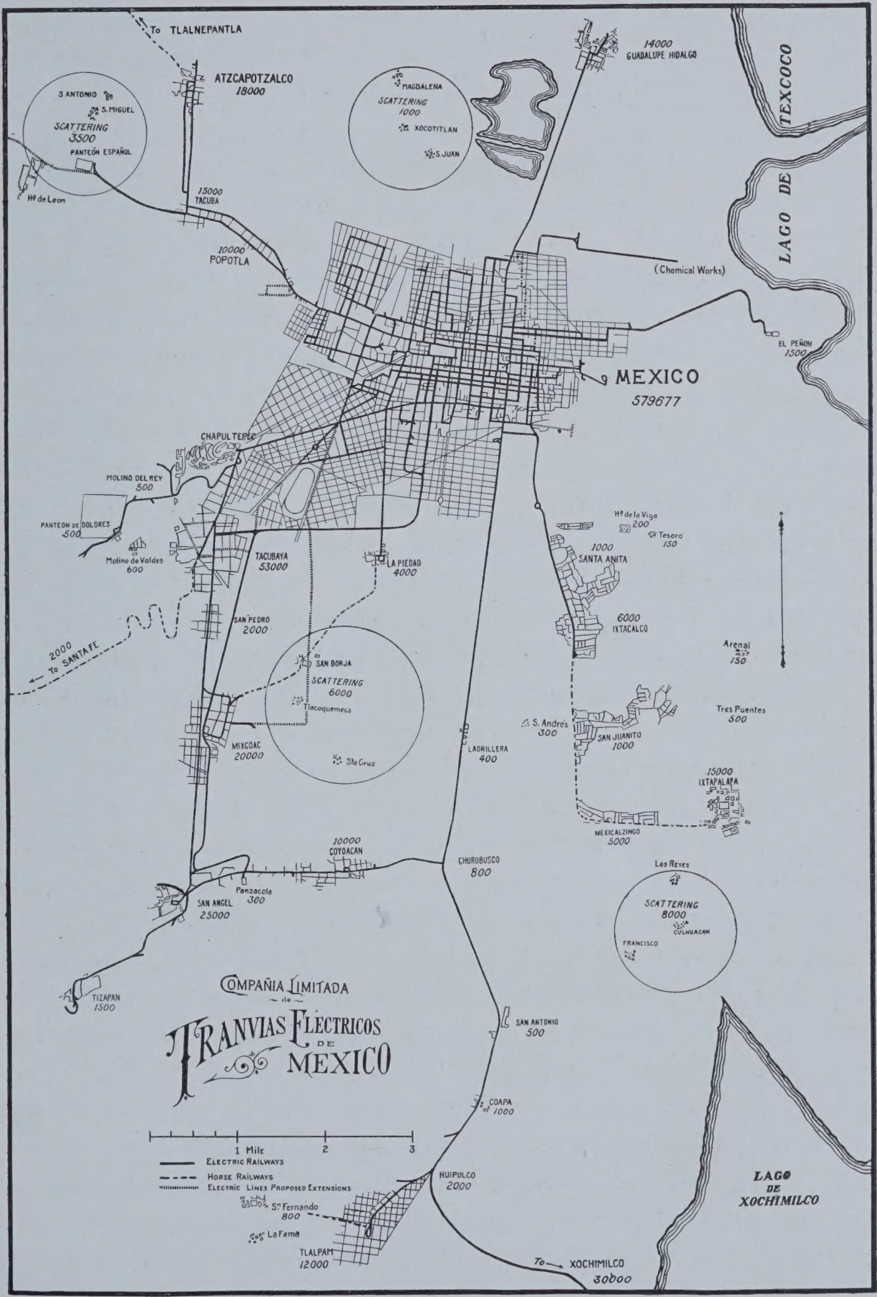
* The twenty-seventh article of this series.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MEXICALZINGO
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CHURUBUSCO
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Los Reyes
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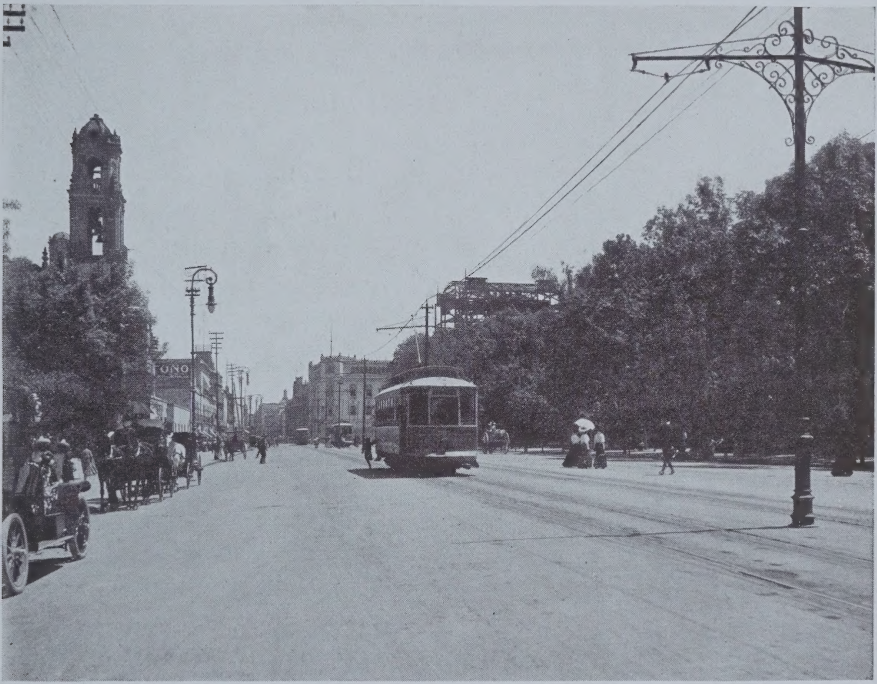
LAGO DE XOCHIMILCO

ipal Palace, and many churches, while among the latter are the Post Office, the theatre, the Communications building, the normal school, etc., not to mention hundreds of beautiful residences, clubs, etc.

The lower classes, composed chiefly of Indians, cling to their ancient customs and means of living, and their crude dwellings are in great contrast with the modernized city. The government has taken steps to alleviate the lower classes and teach them to live in a sanitary and healthful way, which soon should have its effect in generally benefiting the health of the city.

The electric railway system, as the map shows, covers the city with a network of lines, and extends into the Federal District in every direction. It has been the chief factor in the expansion and improvement of the city and its suburbs, and is more closely related to the life of the citizens of Mexico than is the case in most cities. The cars are used by all classes in their daily life, for business and pleasure, for attending religious services and funerals, and for the transportation of building materials, merchandise, household goods, etc. The company operating the system is the Mexico Tramways Company, a Canadian company with its head office in Toronto, Ontario. This company owns and operates all the electric lines in the City of Mexico and the Federal District, consisting at the present time of 158.62 miles of electric lines, and 21.31 miles of mule lines. In the near future the mule lines will disappear, as they will be electrified. Additional concessions have been lately acquired, and new lines will be constructed, further extending the system. One of the lines proposed is an interurban division to Puebla, capital of the state of the same name, and a city of about 100,000 people. This line will be about 103 miles in length, and passing through Amecameca will climb the west slope of the Volcano of Popocatepetl, reaching an elevation of 13,600 feet, at which point the railway will be nearly up to the snow line, and within easy distance of the summit of Popocatepetl on one side, which has an altitude of 17,798 feet, and Ixtaccihuatl on the other, with an altitude of 16,076 feet. Both of these volcanoes are extinct and are snow clad the year round. This line will form one of the grandest scenic railways in the world, and much of its way will pass through wheat fields and pine forests. From its summit the panorama embraces hundreds of miles and it is possible to see in the distance the green sugar cane fields, 9,000 feet below, far down in the hot country.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Ornamental center poles are used to carry the overhead construction on the lines traversing avenues

Another proposed extension is to the city of Toluca, which has a population of about 30,000 people and is about 45 miles west of Mexico City.

Within the last five years the present company, of which Dr. F. S. Pearson is president, has developed a system and has established a standard of service and equipment not excelled by the most advanced in any part of the world, and this in the face of many abnormal conditions of customs, people and language. The service is divided into city and suburban, first- and second-class, freight and funeral, each one requiring its own special equipment. The city service is equipped with first-class cars with a uniform fare of 6 cents Mexican currency, the cars being for the most part double-truck cars, although there are some single-truck cars in this service. The suburban service is chiefly operated by trains, motor cars being first-class and the trail cars second-class, but in addition there are certain lines operating only first-class motor cars and separate second-class motor cars. The types of cars are of the best and the truck and motor equipment strictly up-to-date. For the suburban business, a special express or "Rapido" service has been established, consisting of express trains from the principal suburbs to the center of the city. These trains are operated

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE Handling a crowd at a bull fight. The largest bull ring in Mexico City is a steel and concrete structure accommodating 30,000 people into the city in the early morning, returning to the suburbs at 1 o'clock and again back to the city at 2.30, returning to the suburbs again at 7 in the evening. The longest route served by this service is 11 miles, and the run is made in 30 minutes, the "Rapido" making only two or three stops in the run.

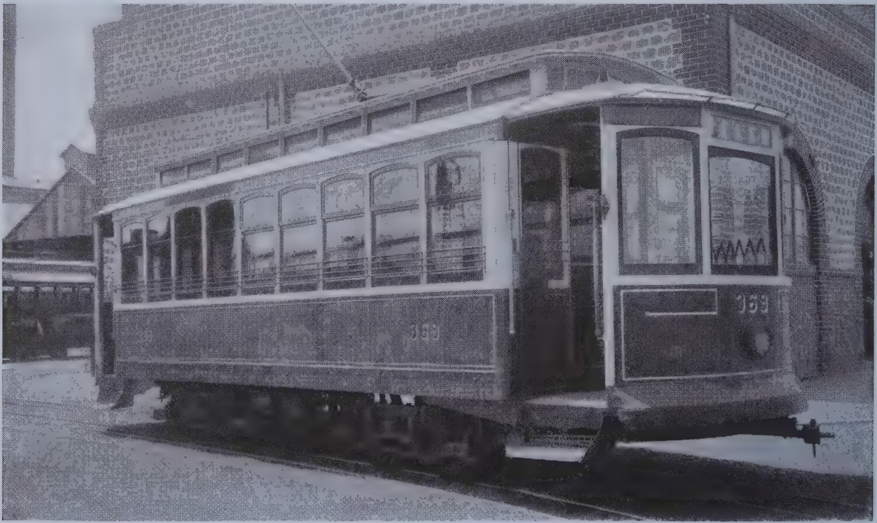
The freight service is supplied by trains of two cars each, the motor car being either a closed or a gondola type with gondola trailer. These cars have a capacity of about 30 tons. The equipment for transportation in connection with funerals is varied, and consists of many types, to suit all the various conditions of life, even in Mexico. This system grew up from the fact that the cemeteries are, with one exception, a number of miles outside of the city, and the roads leading to them in the past were rough country roads. The service supplied by the company is so satisfactory in this regard that it might well be imitated by other cities.

In addition to the above, the company operates for special occasions a number of fine private cars, which are chartered for private parties, and are used by public officials and for the "Seeing Mexico" service, which is especially attractive to the foreign traveler on account of the many points of beauty and historic interest which are reached by this service. The car equipment consists of the following: First-class passenger motor cars 240, trail cars 26, second-class passenger motor cars 8, trail cars 122, freight motor cars 42, trail cars 72, funeral equipment 85.

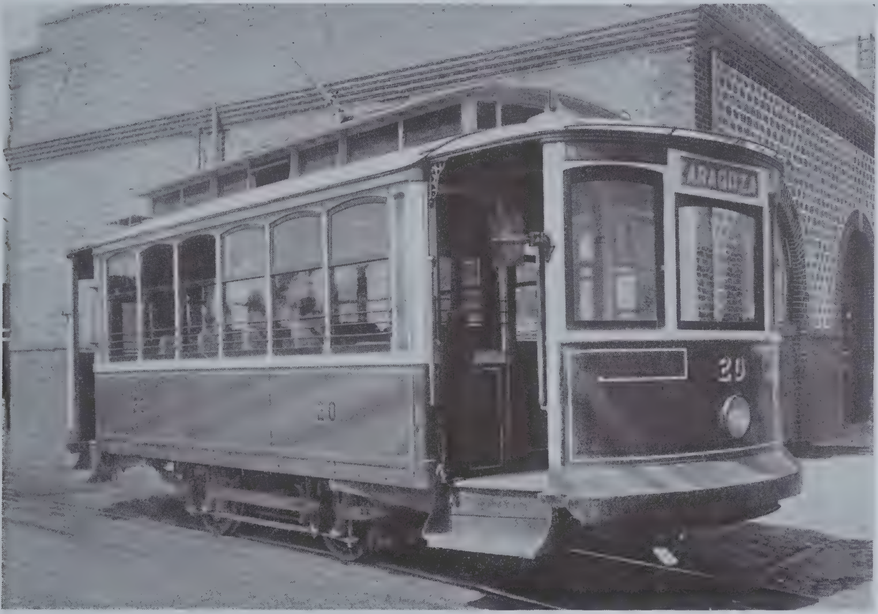
The J. G. Brill Company and the American Car Company have furnished 154 cars and a large number of the trucks used on this system. The Brill semi-convertible type is well represented among the types used. The Mexico Tramways Company has built in its own shops all of its cars added to its equipment during the last four years. The shops are located near the head office of the company in the section of the city known as Indianilla, where also are located the principal car barns, the steam power house and storage battery, overhead line and track departments, dispatcher's office, printing shop, inspection shop, etc. The machine shop is entirely manned by Mexicans, who are satisfactory workmen. Motormen and conductors are also native Mexicans, and are most satisfactory employees. The company also has in other parts of the city two large car barns and freight yard, besides two blocks devoted to the storage of general stores and construction materials.

The method of operating the system is not peculiar, except that most of the cars pass round the central plaza, following the loop system, so that at this plaza it is possible to take cars going direct to almost any point on the system. Another feature is the use of two adjoining parallel streets with a single track on each street instead of double tracks. This is necessary in the old part of the city, on account of the very narrow streets.

The principal operating difficulty arises through the very heavy traffic on feast days, Sundays and other holidays, at



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Standard city car mounted on Brill No. 27-G Trucks. The exterior appearance of first- and second-class cars is almost identical



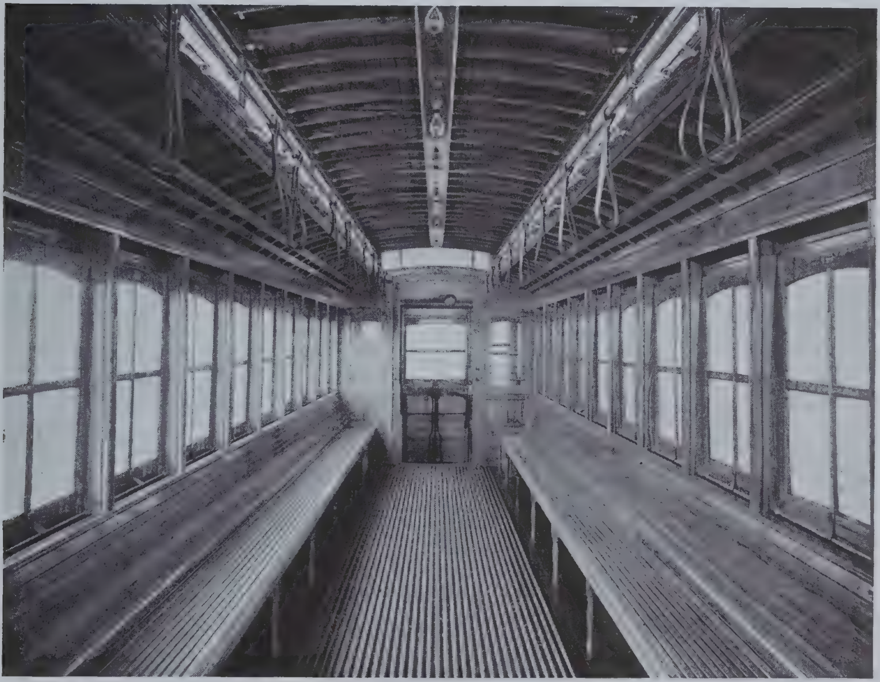
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Short city car mounted on Brill No. 21-E Truck

which time the people largely move to some one point to attend a religious festival, or possibly a bull fight. There are two principal bull rings, the largest one of which is constructed of steel and concrete and will accommodate 30,000 people. At times when there are large gatherings through widely different parts of the city, it taxes the company's equipment to its very limit to accommodate the public. This the company is doing in a very satisfactory way, largely through the use of very long open trail cars which are attached to the suburban motor cars. A number of the suburban lines reach popular points of interest, such as parks, lakes, country club, beautiful suburbs, etc. This business has been carefully developed, and the service is both adequate and attractive. In the crowded narrow streets in the central portion of the city the cars necessarily move at a slow rate of speed. To properly control the speed, cars have been equipped with special controller handles, which prevent the turning of the controller beyond the point at which the motors operate in series. At the limit of the low speed zone, handles are exchanged for the regular type of handle. Smoking is only permitted on open trail cars and on second-class cars. The second-class cars, both motor and trail, are equipped with large side doors for the handling of all kinds of packages, farm produce, fruit, flowers, etc., when in charge of a passenger or passengers, the largest package carried being an upright piano. The charge is proportionate to the dimensions and weight of the article carried.

Conditions which Govern the Type of Car for City Service. Interior of double-truck city car of Brill semi-convertible type

The type of track construction used in the city proper, and on all paved streets, consists of a solid mattress of reinforced concrete under each track, in which steel channel ties are imbedded. The rails are 80- and 114-lb. girder sections with continuous joints and tie rods. On all suburban and interurban lines, most of which are upon private right of way owned by the company, 70-lb. A. S. C. E. Tee rails are used, laid on creosoted ties, substantially ballasted with crushed stone.

The company obtains its power from the hydro-electric plant of The Mexican Light & Power Co. Ltd. This plant is 90 miles from Mexico City, and supplies power, not only to the Mexico Tramways Co. but to the whole of the Federal District and all the large mining camps at Pachuca and El Oro. Transmission lines are carried on steel towers and operate at a potential of 70,000 volts. The power is distributed from the main receiving station of The Mexican Light & Power Co. to seven sub-stations of the Mexico Tramways Co. located in



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of second-class double-truck car different sections of the city and the Federal District, two of these stations receiving the current at 3,000 volts and the others at 20,000 volts A. C., distributing it again at 600 volts D. C. In addition to these sub-stations, the company has equipped a steel car with a motor generator set and switchboard of 500 K. W. capacity, and this is used as a sub-station, being connected to the A. C. lines of The Mexican Light & Power Co. Ltd. at any point on the system where abnormal conditions require additional temporary power.

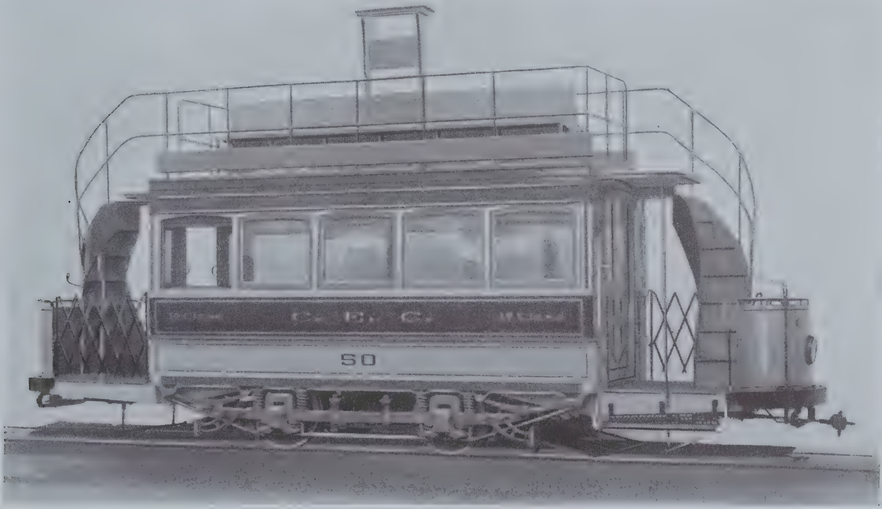
All city fares are 6 cents, but on leaving the city limits the fare increases in proportion to the distance, the basis of charge being 3 cents Mexican currency for each mile traveled. The second-class fare is about 40% less than the first-class fare. The European system of fare receipts, viséd by inspectors, is in force and has been found very satisfactory, not only to the company but to the traveling public.

* * *

SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE

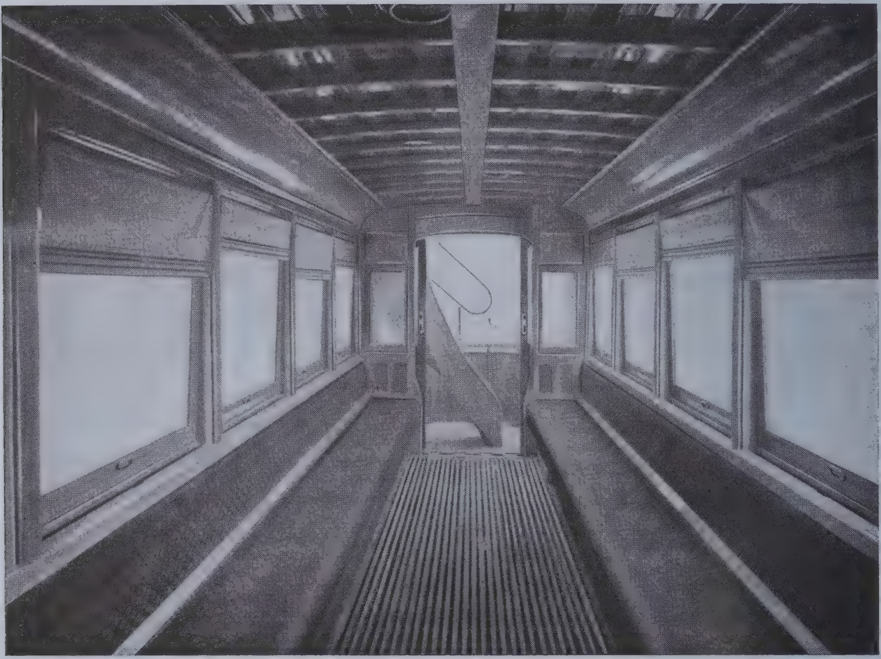
BRILL No. 21-E TRUCK

TEN cars of the type illustrated were shipped a few weeks ago to the Compania Electrica de Concepcion by The J. G. Brill Company, with whom the order was placed by W. R. Grace & Co., New York. Concepcion is an important manufacturing city and is the commercial center for a large surrounding territory. It is 350 miles south of Santiago, with which it is connected by rail, and it is also connected with all of the chief cities in the Republic by rail and by steamship lines from its port, the city of Talcahuano, 9 miles distant. The electric railway system includes a line to Talcahuano, over which are operated first- and second-class double-truck cars, built by the John Stephenson Company. Brill cars and trucks have been in use on the city lines since their electrification, and the present order is to supplement this equipment and obviate the use of trail cars, except for rush-hour service.



SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE. Ten of these 40-passenger cars with Brill No. 21-E Trucks were shipped a few weeks ago to southern Chile

The cars are substantially built to enable them to carry a heavy load on the upper deck without straining the members under rapid starting and stopping. The side sills of yellow pine are 4½ x 5½ in.; oak end sills, 3¾ x 4¾ in.; oak crossings, 3½ x 4 in. The corner posts are of ash, 3⅝ in. thick; ash side posts, 2¼ in. thick; sweep of posts, 2½ in. Steel rafters ⅝ in. thick are sandwiched between the wooden rafters to relieve to best advantage the strains from the trolley apparatus. Cherry slat seats covered with Wilton carpet and double-coated curtain materials are durable, and, with the ash



SHIPMENT OF DOUBLE-DECK CARS TO CONCEPCION, CHILE. The interiors are finished in ash of natural color. The window sashes drop into wall pockets

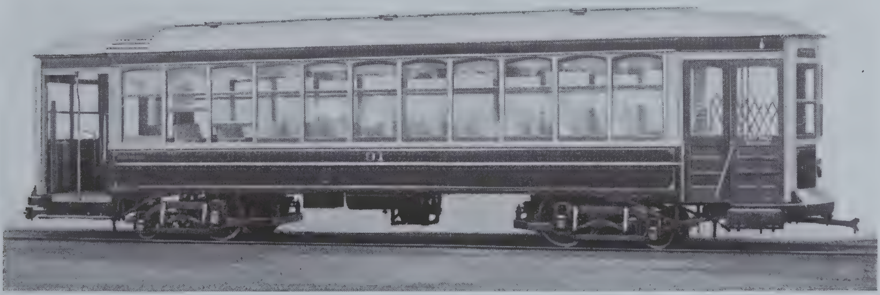
finish of the interior, bronze trimmings make a bright and attractive appearance.

Length of body over corner posts	15 ft. 11⅞ in.
Length over platforms	27 ft. 11⅞ in.
Length front platform	6 ft.
Length rear platform	6 ft.
Centers of side posts	3 ft. 0½ in.
Width over sills, including sheathing	6 ft. 1 in.
Width over posts at belt	6 ft. 5 in.
Extreme width	6 ft. 7⅛ in.
Height track to under side of side sills	2 ft. 4⅝ in.
Height under side of side sills over trolley boards	12 ft. 10¾ in.
Height floor to center of rafter	6 ft. 8¼ in.
Height track to top step tread	12⅛ in.
Height step tread to car	13 in.
Height platform to car floor	6⅜ in.
Seating capacity	40
Type of trucks	21-E
Type of motors	G.E. 54
Total wt. less electrical and air equipment	12,275 lbs.

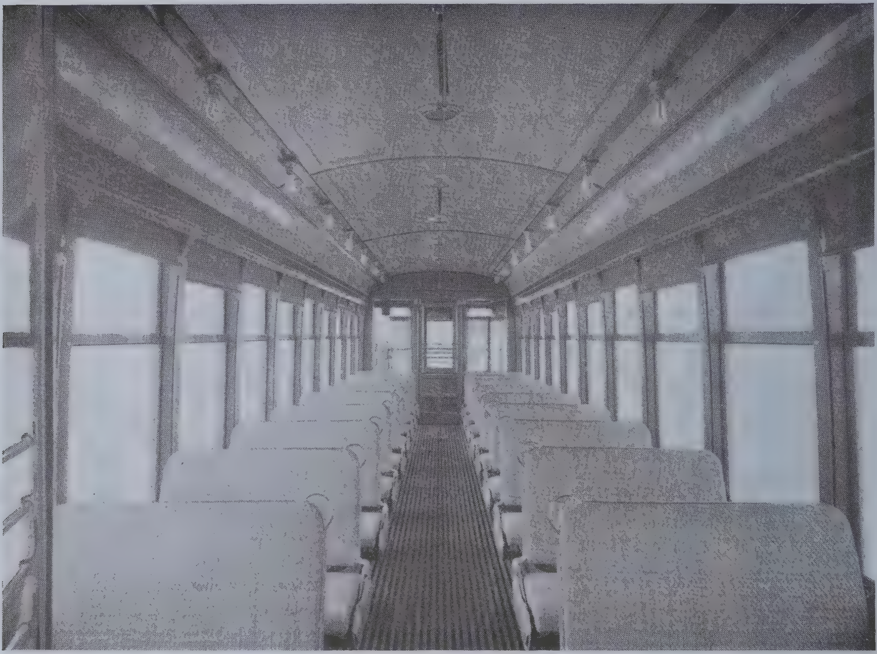
PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA.

BRILL PLAIN ARCH ROOF

THE Macon Railway & Light Company, of Macon, Ga., has lately added to its equipment six cars of the type illustrated, built by The J. G. Brill Company. Up to the time of the receipt of the new cars, there were 55 motor and 20 other cars in operation on the 31 miles of trackage comprising the system. The Pay-As-You-Enter System has been introduced in Macon by means of these cars, which represent, in every particular, the most advanced ideas in car construction and operation. The photographs show the excellent appearance of the exterior and interior, especially the bright and attractive appearance of the latter. With the semi-convertible windows all raised into the roof pockets, the cars appear from the interior to be entirely open at the sides; this is on account of the extra height of the windows and the low window sill. Natural draft ventilation, with Globe ventilators, is used. The platforms have the usual P-A-Y-E arrangements, except that the entrance and exit at the rear are closed by a folding gate hinged to the vestibule corner



PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA. The platforms are of the usual P-A-Y-E type, except that a high folding gate hinged to the vestibule corner post is used instead of doors



PREPAYMENT SEMI-CONVERTIBLE CARS FOR MACON, GA. When the window sashes are all raised into the roof pockets, the extra high window openings give the appearance of an entirely open summer car

post. The exit at the forward end is closed by a sliding door with mutually operating step; the step at the rear is also operated mechanically.

The exit door in the body ends slides into the bulkhead and is operated by the motorman by means of a pedal. The upper part of the vestibules are fitted with double sash, the top sashes arranged to drop and the lower sashes are stationary. Small lights of glass are placed over the drop sash with roller sign in the center window. The seats are of the Brill "Winner" type, 36 in. long, and the aisle is 22 in. wide. A single seat is placed longitudinally at each corner and at two of the corners an additional seat is provided, which is hinged and arranged to fold up. The lighting arrangement furnishes a lamp over the center of each seat. The cars are built with all-steel underframes of the Brill standard type described and

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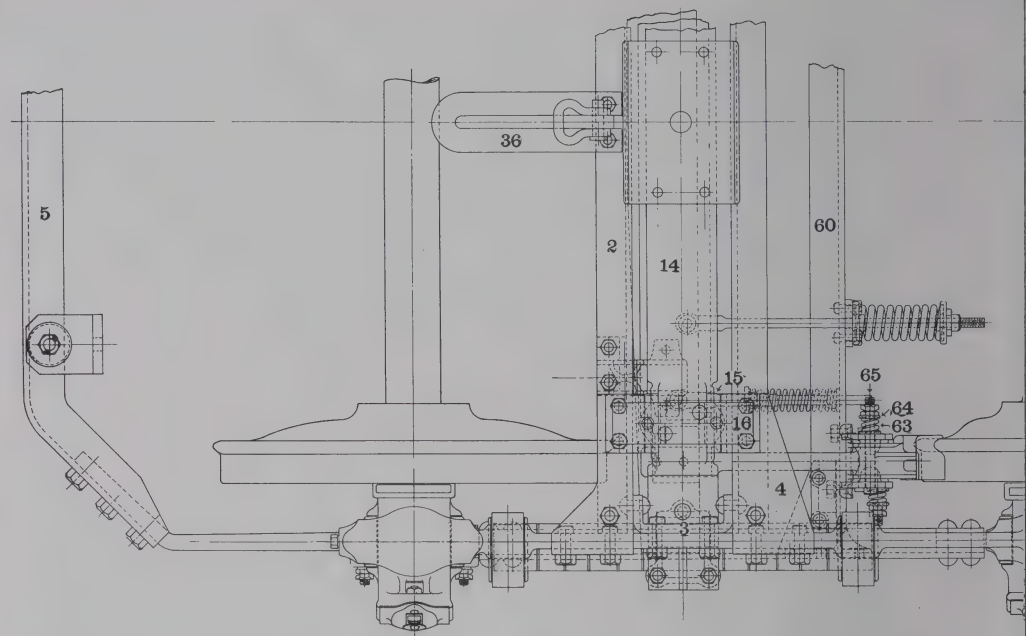
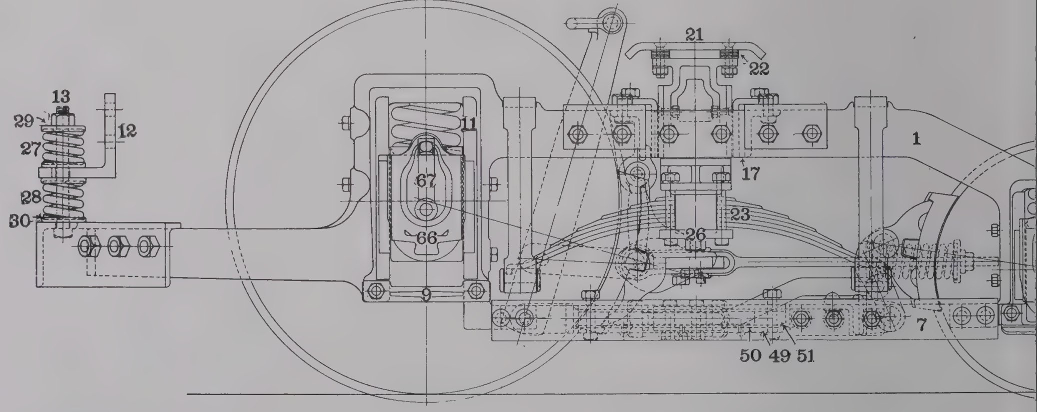


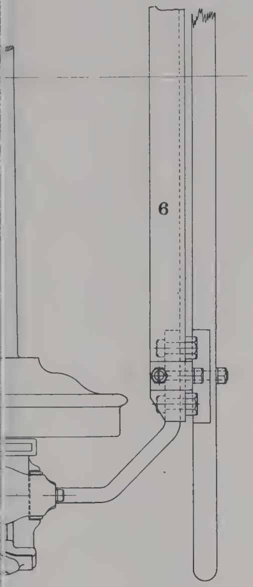


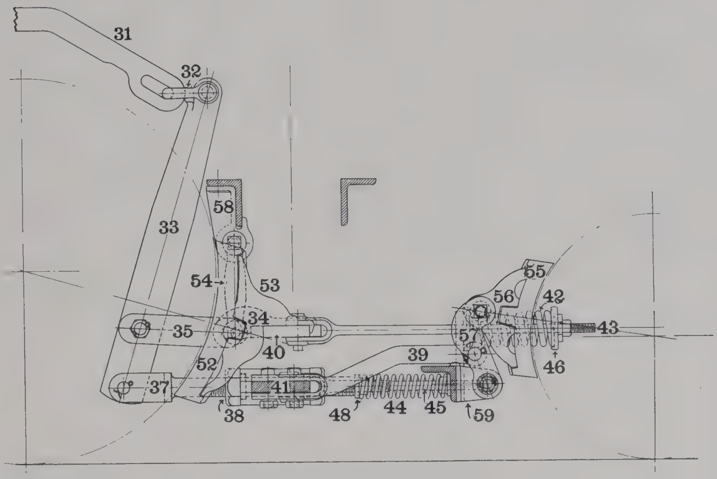
Names of Parts

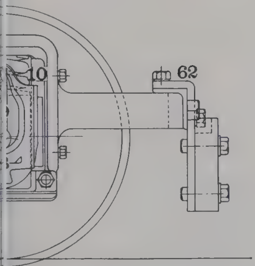
1 Side Frame
2 Transom
3 Double Corner Bracket
4 Transom Gusset Plate
5 Motor End Crossing
6 Trail End Crossing
7 Tie Bar
8 Small Pedestal Tie Bar
9 Large Pedestal Tie Bar
10 Small Pedestal Gib
11 Large Pedestal Gib
12 Motor Support
13 Motor Bolt
14 Bolster (cast in a single piece including side bearings)
15 Side Bearing Chafing Plate
16 Transom Chafing Plate
17 Chafing Plate Filling Block
18 Truck Bolster Pivot Plate
19 Body Bolster Pivot Plate
20 Truck Bolster Pivot Plate Ring
21 Side Bearing Rub Plate
22 Side Bearing Adjusting Plate
23 Semi-Elliptic Spring
24 Semi-Elliptic Spring Link
25 Semi-Elliptic Spring Rocker Seat
26 Semi-Elliptic Spring Seat
27 Motor Support Coil Spring, Upper
28 Motor Support Coil Spring, Lower
29 Motor Support Coil Spring Cap (same for upper
lower springs)
30 Motor Support Coil Spring Seat (same for upper
lower springs)
31 Brake Rod Stub
32 Clevis
33 Upright Lever

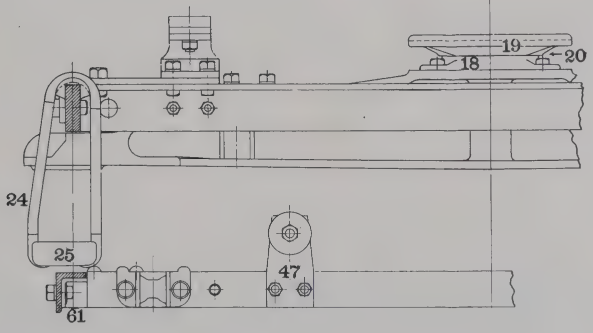
9-E TRUCK

TED)









34 Upright Lever Holder
35 Upright Lever Fulcrum
36 Upright Lever Guide
37 Bottom Brake Rod
38 Bottom Brake Rod Adjusting Nut
39 Brake Connecting Rod
40 Driving Wheel Brake Beam
41 Trail Wheel Brake Beam
42 Driving Wheel Brake Beam Release Spring
43 Driving Wheel Brake Beam Release Spring Bolt
44 Trail Wheel Brake Beam Release Spring
45 Trail Wheel Brake Beam Release Spring Bolt
46 Driving Wheel Brake Beam Release Spring Caps
47 Driving Wheel Brake Beam Release Spring Bracket
48 Trail Wheel Brake Beam Release Spring Caps
49 Brake Beam Slide
50 Brake Beam Slide Wear Plate
51 Brake Beam Slide Filler

52 Driving Wheel Brake Shoe
53 Driving Wheel Brake Shoe Holder
54 Driving Wheel Brake Half-Ball Hanger
55 Trail Wheel Brake Shoe
56 Trail Wheel Brake Shoe Holder
57 Trail Wheel Brake Half-Ball Hanger
58 Driving Wheel Brake Shoe Hanger Holder
59 Trail Wheel Brake Shoe Hanger Holder
60 Lever Support
61 Lever Support Bracket
62 Life Guard Bracket
63 Brake Hanger Spring
64 Brake Hanger Spring Cap
65 Brake Hanger Spring Bolt
66 Driving Wheel Journal Box
67 Driving Wheel Journal Box Lid
68 Trail Wheel Journal Box
69 Trail Wheel Journal Box Lid

illustrated in the February issue of BRILL MAGAZINE. The entire underframe of the car, with platform knees, bumpers and bolsters complete, weighs but 4476 lbs. The cars are mounted on Brill No. 39-E1 trucks, with 4-ft. 6-in. wheel base and 33- and 21-in. wheels. The trucks have A. E. R. A. brake shoes.

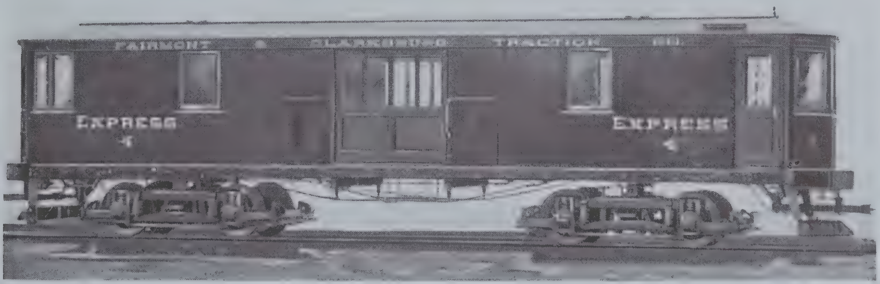
Length of body	30 ft. 8 in.	From step to platform	14 in.
Length over platforms	42 ft. 8 in.	From platform to car floor	10⅛ in.
Length of platforms	6 ft.	Seating capacity	41
Centers of side posts	2 ft. 8 in.	Type of trucks	Brill 39-E1
Width over sills	7 ft. 11½ in.	Type of motors	GE-90—2-50 h.p.
Width over posts	8 ft. 2 in.	Wt. of car body less elec. equip.	15,400 lbs.
Extreme width	8 ft. 5⅜ in.	Wt. electrical equipment	10,500 lbs.
From track to sills	2 ft. 7 $\frac{9}{16}$ in.	Wt. of air brake equip.	17,000 lbs.
From sills to trolley boards	9 ft. $\frac{3}{16}$ in.	Wt. of trucks	9,400 lbs.
From floor to headlining	7 ft. 9⅞ in.	Wt. of motors	5,750 lbs.
From track to step	14⅞ in.	Total weight	33,300 lbs.

* * *

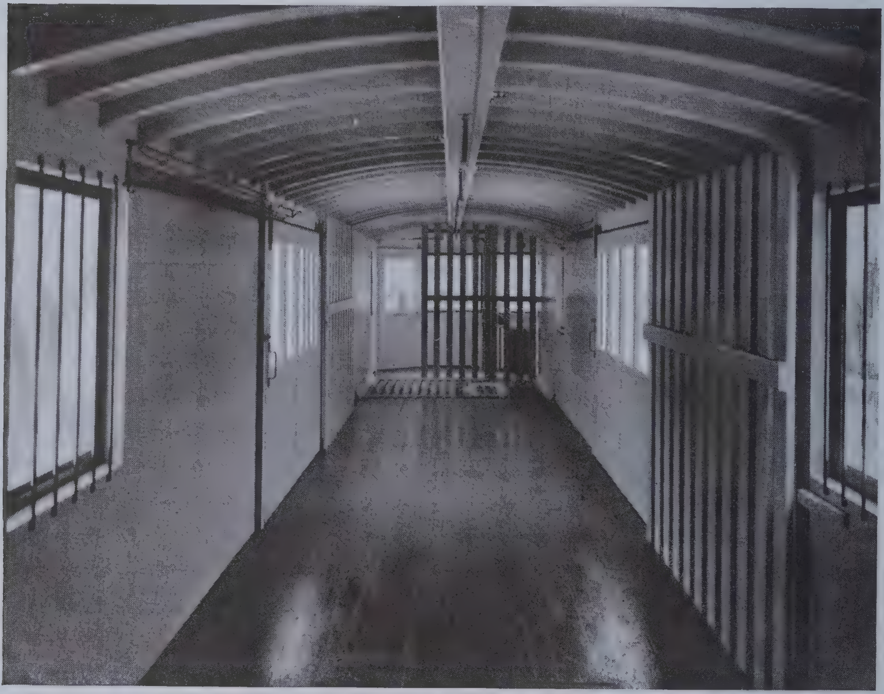
EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION CO.

HIGH-SPEED SERVICE

TWO express cars of an interesting design have been recently received by the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va., from the G. C. Kuhlman Car Company. These cars are powerfully constructed to suit them to heavy loads and fast service. As will



EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION COMPANY. A well designed car for fast and heavy service be seen in the accompanying photographs, the cars have plain arch roofs, with car-line finish and wide sliding doors on each side at the center. Two hinged doors are provided at each end; the one at the right of the motorman closes against the corner post, while the other forms a part of the end and is intended for admitting long pieces of material. A partition, composed of wooden slats, is provided at the back of the motorman at each end of the car. The car is well lighted with three windows at each side, in addition to the lights in the upper parts of the sliding and swing doors. Double basket racks are conveniently placed at the side of each sliding door to receive small and light packages.



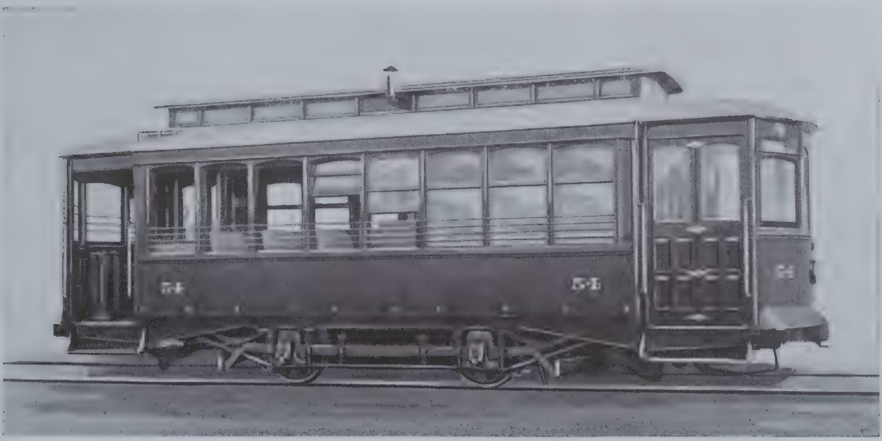
EXPRESS CARS FOR FAIRMONT & CLARKSBURG TRACTION COMPANY. Long pieces of material are admitted through doors in the ends

Length of body	39 ft. 10 in.	From sills over trolley board	8 ft. 5½ in.
Length over bumpers	45 ft. 6 in.	Type of trucks	Brill No. 27-E2
Width over sills	8 ft. 6 in.	Type of motors	4—West. 304
Extreme width	8 ft. 8 in.	Wt. of car body less elec. equip.	19,420 lbs.
From track to sills	3 ft. 2 in.	Wt. of trucks	23,260 lbs.

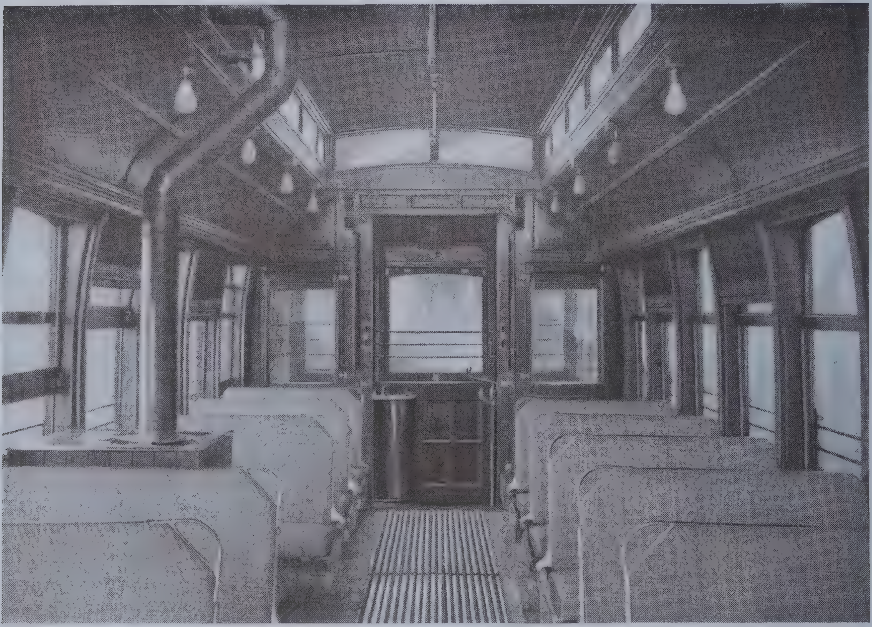
SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS.

STRAIGHT SIDE CONSTRUCTION

THE American Car Company has recently delivered to the Southern Wisconsin Railway Company, of Madison, four single-truck cars of the Brill semi-convertible type. These cars have the usual dimensions and features of this type, except that the sides are straight instead of curved, the platforms are a trifle longer and the cars are wider than usual. The cars were needed to take care of the increasing traffic, which has called for 13 cars in the regular service and 5 additional for the extra service during rush hours. There is heavy riding at noon as well as at morning and night. On special occasions as many as 30 cars are put on the lines. The system comprises 14 miles of track, with grades as severe as 7 per cent. in some cases. One of the chief difficulties of street railway operation at Madison is the number of railroad crossings. These cause frequent delays and are a constant menace



SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS. There being no restrictions as to width, the cars were made 8 ft. 8 ins. over the posts and the sides of straight construction



SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR MADISON, WIS. Note the extra wide aisle and the excellent location of the lamps over the center of the seats

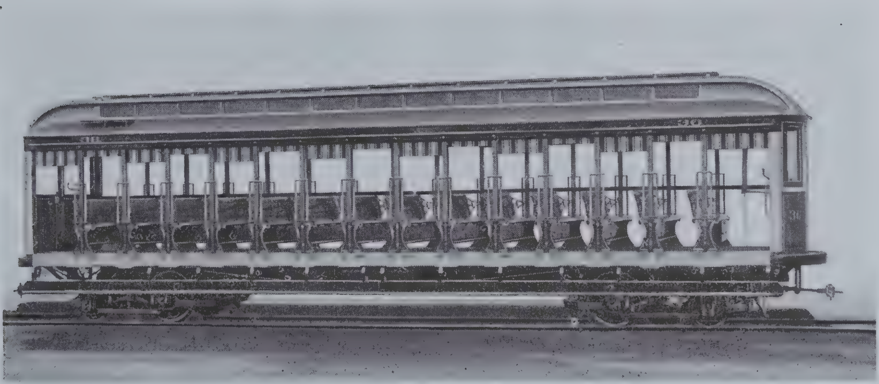
to the safety of the riding public, for no matter how well guarded, the danger of accidents is always more or less imminent. The streets are wide, allowing the cars to have an extreme width of 8 ft. 11 in., and the shortest curve radius is 45 feet. Fare collection is by the usual method. The charge is 5 cents for adults and children 3 cents. Tickets are furnished which are only for convenience as far as adults are concerned, as there is no discount; but for children the tickets are 2½ cents instead of cash fare of 3 cents. Universal transfers are issued for continuous trips.

Length of body	20 ft. 8 in.	From floor to headlining	8 ft. 5½ in.
Length over platforms	31 ft. 2 in.	From track to step	14$\frac{15}{16}$ in.
Length of platforms	5 ft. 3 in.	From step to platform	13 in.
Centers of side posts	29 in.	From platform to car floor	10 in.
Width over sills	8 ft. 8 in.	Seating capacity	32
Width over posts	8 ft. 8 in.	Type of trucks	Brill No. 21-E.
Extreme width	8 ft. 11 in.	Type of motors	GE-88—2-20 h.p.
From track to sills	26⅝ in.	Wt. of car less elec. equip.	15,000 lbs.
From sills to trolley boards	9 ft. 3¾ in.		

OPEN CARS FOR DANBURY, CONN.

NARRAGANSETT TYPE

THE Danbury & Bethel Street Railroad Company has just received cars of the type shown in the engraving from The J. G. Brill Company. These are the first cars of the Narragansett type to be ordered by the Danbury & Bethel Company, and are particularly suited to the conditions of this railway because of curves of unusually short radii and because of the fact that the excursion service calls for long open double-truck cars loading from the pavement. By mounting the cars on Brill 39-E single-motor trucks, the radiation of the driving wheels and motors is reduced and the car enabled to negotiate a curve as sharp as 23 feet radius. A distinct advantage of the Narragansett type is its narrow width for a double-step car. The width is but 7 ft. 9½ in. over the posts and the extreme width is only 8 ft. 4 in. with both running boards raised and 8 ft. $11\frac{15}{16}$ in. with one running board raised and the other lowered. These cars are popular with the patrons of the roads wherever they are in operation because of their easy access and large capacity. The car



OPEN CARS FOR DANBURY, CONN. These are the first cars of the Narragansett type to be mounted on single-motor trucks. The arrangement permits a 42-ft. car to negotiate a curve of 23-ft. radius illustrated accommodates 70 seated passengers or 5 to each seat. The curtains can be drawn entirely to the floor, and, with the vestibule ends, give complete protection in case of stormy weather.

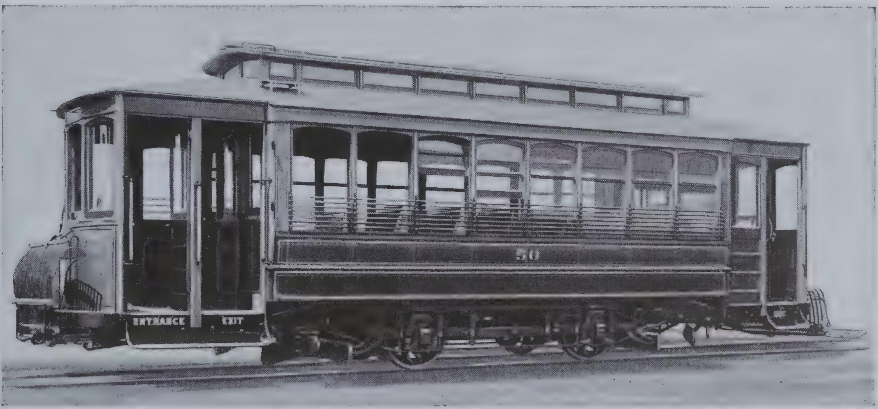
Length over corner posts	32 ft. 8¾ in.
Length over platforms	41 ft. 8¾ in.
Length front platform	4 ft. 6 in.
Length rear platform	4 ft. 6 in.
Centers of side posts	2 ft. 6 in.
Width over sills including angles	7 ft. 9½ in.
Width over posts at belt	7 ft. 11 in.
Extreme width	8 ft. 4 in.
Height track to under side of side sills	2 ft. 10⅝ in.
Height under side of side sills over trolley boards	9 ft. 2¾ in.
Height floor to center headlining	8 ft. 2⅝ in.
Height platform to car floor	7¼ in.

Height track to top step tread	20 in.
Height step tread to platform	15⅜ in.
Seating capacity	70
Type trucks	39-E1
Type motors	G. E. 1200-2—45 h. p.
Weight of car body, less electrical equipment	14,000 lbs.
Weight of electrical equipment	2,000 lbs.
Weight air brakes	2,000 lbs.
Weight trucks	10,050 lbs.
Weight motors	5,948 lbs.
Total weight	33,998 lbs

SEMI-CONVERTIBLE P-A-Y-E CARS FOR BENTON HARBOR, MICH.

INITIAL PREPAYMENT EQUIPMENT

BENTON HARBOR is in the extreme southwestern part of Michigan, about 1½ miles from Lake Michigan, with which it is connected by a ship canal. It is the center of a great fruit region, and being but 60 miles from Chicago, on the Pere Marquette Railroad, a ready and easily accessible market is found for its products. Canning and pickling of the fruits which grow so abundantly in this region and the manufacture of fruit baskets and of furniture are among the leading industries of Benton Harbor. Numerous mineral springs in and about the city furnish excellent water, which is bottled and shipped in large quantities. The spirit of progressiveness is evidenced very strongly in the many industries of Benton Harbor, and this is particularly true with reference to its electric railway system, owned and operated by the Benton Harbor-St. Joe Railway & Light Company. Current is obtained from the Berrien Springs Power & Electric Company and is transformed and distributed at the power station located in St. Joseph for the railway and commercial purposes. This system operates about 40 miles of track, standard gauge, and has 24 cars. Four Brill semi-convertible cars with 20 ft. 8 in. bodies and P-A-Y-E platforms have recently been received from the Danville Car Company. The seats are of the transverse type, six on each side of the aisle, giving a seating capacity of 24. The doors which close the entrance and exit are hinged to a wooden upright from which extends the P-A-Y-E railing and the front exit is provided with a sliding door. The steps at front and rear are of the stationary type. The window guards are composed of seven bars to give ample protection against accidents which might occur on account of the extra low window sill incident to this type of car. The cars are equipped



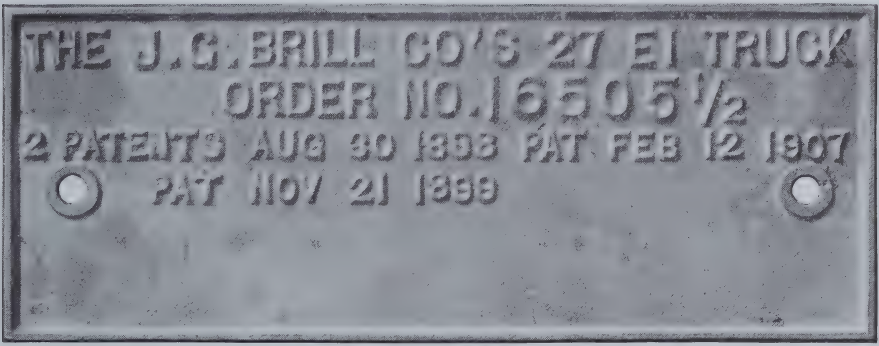
Semi-Convertible P-A-Y-E Cars for Benton Harbor, Mich. The doors at the entrance and rear exit are hinged to a center post. The front exit is closed by a sliding door with vertical bronze brake wheels, track scrapers, sand boxes and other specialties of Brill manufacture. The trucks are of the same company's No. 21-E type and have a wheel base of 8 ft.; wheel diameter, 33 in.; journal boxes, 3¾ in. x 6 in.

Length over corner posts	20 ft. 8 in.	From track to step tread	13$\frac{7}{16}$ in.
Length over platforms (vest.)	31 ft. 8 in.	From step tread to platform	13 in.
Length of front platform	5 ft. 6 in.	From platform to car floor	7$\frac{13}{16}$ in.
Length of rear platform	5 ft. 6 in.	Seating capacity	24
Centers of side posts	29 in.	Type of truck	Brill 21-E
Width over sills	7 ft. 9½ in.	Type of motors	GE 80-2—40 h.p.
Width over posts	8 ft. 2 in.	Wt. of car body	13,110 lbs.
Extreme width	8 ft. 5¾ in.	Wt. of electrical equipment	940 lbs.
Height track to sills	30⅞ in.	Wt. of truck	5,850 lbs.
Height over trolley boards	9 ft. 3¾ in.	Wt. of motors	5,600 lbs.
Height floor to head lining	8 ft. 6½ in.	Total weight	25,500 lbs.

SUPPLEMENTS TO BRILL MAGAZINE

TRUCK AND CAR CHARTS

THE chart of the Brill No. 39-E truck, with names of parts, which accompanies this issue, will be followed each month by similar charts of other Brill trucks, and these will be continued by a series of city and interurban car charts. In making this announcement, the opportunity is taken to repeat the request that users of Brill trucks will facilitate the filling of orders for parts by giving the type and number of the truck for which parts are required and the factory order number. Both of these points can be ascertained with absolute surety by examining the patent plate secured to the side frame of each truck and on which is cast the type and factory order numbers, as shown in the illustration. The


THE J.G. BRILL CO'S 27 EI TRUCK
ORDER NO. 16505½
2 PATENTS AUG 30 1898 PAT FEB 12 1907
PAT NOV 21 1899

A plate similar of the above type is fixed to the side-frame of every truck. The manufacturer's order number and the truck type number which it gives should be mentioned in every order for parts

only other requirement is that the correct name and quantity of the part needed shall be given in the order.

The Brill Order Guide No. 165, which has served for several years and of which four thousand copies have been distributed, will soon be superseded by a much more complete and extensive publication now in course of preparation.

TEST OF THE BRILL HALF-BALL HANGER BY THE PHILADELPHIA RAPID TRANSIT COMPANY

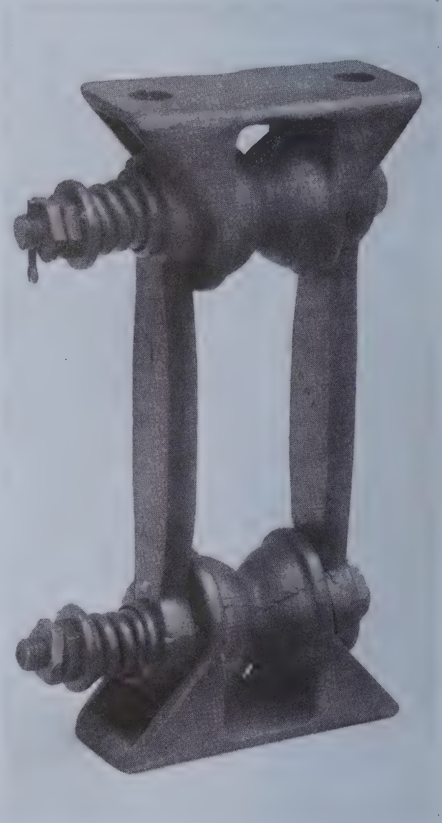
A BRAKE hanger of the Half-Ball type was tested at the 8th and Dauphin Streets shops of the Philadelphia Rapid Transit Company about the first of March, to determine the action of the hanger under various loads and the amount of load necessary to break the hanger.

In this test a weight of 5000 lbs. was first applied. This produced a slight deflection of the springs. A further deflection of the springs occurred when the weight was increased to 10,000 lbs. Beyond this, and up to 35,000 lbs., there was no further deflection on the springs on the end of the hangers, showing that at 10,000 lbs. the usual play between the coils of the springs had been absorbed in the slight increase of space between the hangers. Any further load had no tendency to distort the hanger or fitted parts, thus insuring the integrity of parts and a return of the hangers to their proper positions when the load was removed.

After 35,000 lbs. load had been applied, it was requested by the Brill representatives that the test be stopped at this point to allow a photograph to be made of the hangers for BRILL MAGAZINE.

It is estimated that 10,000 lbs. is about the maximum strain that would be brought on each hanger during service, the usual strain being about 5,000 lbs. The hanger tested is of a type suited to the Brill 27-G truck, the standard truck of the Philadelphia Rapid Transit system.

The Half-Ball Brake Hanger was patented and adopted by The J. G. Brill Company as its standard hanger about two years ago and has been completely successful on all of the railway systems on which it has been in operation.



This Half-Ball Brake Hanger was subjected to a pull of 35,000 lbs. The usual pull is about 5,000 lbs., and the maximum, 10,000

MANUFACTURER'S INSPECTION AND TEST OF TRUCKS

ECONOMY is, and always has been, of paramount importance for the successful maintenance of any business, and in no line of endeavor is this more urgently necessary than in that of passenger transportation by electric power as exemplified by urban and interurban lines. In such service the stops are quite frequent and the curves often are numerous and of comparative short radius, so that, even if the roadbed can be kept in good condition, the braking and inertia stresses subject the rolling stock to many and various cross stresses in addition to the static stresses due to the load alone; so it is evident that economy of maintenance of rolling stock, as well as economy of power consumption, will be a maximum for a rolling stock construction possessing the inherent strength to best resist the continual destructive effect of these many stresses encountered in operation and a construction which will continue to do so for the longest time without deterioration. Whether each transportation unit is self-propelled or is one of a train drawn by a motor unit, but more especially in the case of separate self-propelled units, which are increasing in size, weight and speed, the major portion of the destructive effects of the heavy stresses is borne by the trucks which carry the car body and its load, and in the case of motor units these trucks also must resist the power stresses of the motors. Experience has demonstrated that riveted and built-up truck frames soon rack loose under the constant pounding and twisting of the severe stresses engendered in service and, when any looseness or wearing of the parts occurs, as does happen with riveted and built-up frames, the truck will work out of "square," and when this occurs the axles then lose their parallel relation; the alignment of the motors is destroyed; the journal boxes lose their freedom of movement in the jaws of the pedestals; the proper set of the journal bearings is disturbed, resulting in hot boxes, heated motor bearings, dangerous temperature rises in the motor, tendency of the wheels to "climb" and thereby cause derailment; and a train of evils which not only cause a rapid and large deterioration of the truck and motors but a great and unnecessary amount of power consumption. In the design and construction of truck frames to resist such deterioration as has been mentioned as occurring when proper means have not been taken to meet the destructive effects of the severe stresses, The J. G. Brill Company has standardized the various types of trucks manufactured by them, and each type has been so designed and constructed as to best meet the various conditions of service to which it will apply; and these designs and methods of construction have been arrived at by long experience and careful calculation of each part, both as to the adaptability and strength of the part for its proportion of the total stress, and also its relation to the frame as a whole, so as to maintain the integrity and "squareness" of the complete truck under the most severe test of service. In this connection we will speak of the solid forged or cast side frames which are rigidly connected with the transoms by forged corner brackets and flanged gusset plates, by means of tapered bolt connection through drilled and reamed holes, with faced surfaces under bolt heads and nuts; curving of ends of frames around wheels to afford large bolting surface for end angles, which are also secured by tapered bolts drilled and reamed with faced surfaces under bolt heads and nuts; also the pedestal faces are machined square to the center line and parallel to one another. When the main frame is assembled as above, the wheel base centers of pedestals are carefully gauged with steel trammels and the perpendicular distance between frame centers carefully gauged in the same manner, then the distance between diagonal pedestal centers checked in the same careful manner and the truck frame is then known to be absolutely "square" and, moreover, the substantial methods of construction before mentioned preclude its getting "out of square," either from the thrust of the leading wheel on curves or from other cross stresses encountered in actual service. Each separate spring entering into the spring series of any particular type of truck is proportioned for the load it will carry, depending upon the condition of loading, and is separately tested for deflection under the predetermined loads by hydraulic testing machines of the most modern description before being assembled in the truck frame. The brake rigging and other parts going to make up the whole equipment of the truck, including the bolster, are carefully inspected and assembled under the supervision of an expert inspection force, and the complete assembled truck is then run upon a testing stand and, by hydraulic power, subjected to a load equivalent to the total load which the truck will carry—including a proper reserve as a safety factor—and the load is then decreased to the equivalent of that of the light car body, when the height from the rails over the pivot plate is measured and made to correspond to that specified; and each and every moving part is carefully examined for assurance of its proper functioning and freedom of movement. When the wheels and axles are furnished by this company, the axle material must meet stringent specifications as to chemical and physical tests and it is then machined as specified and all finished work accurately gauged with micrometer gauges. All wheels are first carefully inspected for surface flaws and then accurately centered and bored, with due allowance made for a press fit upon the axles; then they are placed upon the axles and carefully pressed to the specified gauge in a hydraulic wheel press; after which, except with rolled steel or steel tired wheels, they are accurately ground to true circles in wet wheel grinders. In conclusion, attention is directed to the policy of this manufacturing company in maintaining an efficient inspection force whose duties are to carefully inspect and check the manufacturing and structural details of the trucks, and thereby assure a practical achievement of the theoretical engineering efficiency of all trucks designed and built by this company.

A HISTORY OF THE J. G. BRILL COMPANY

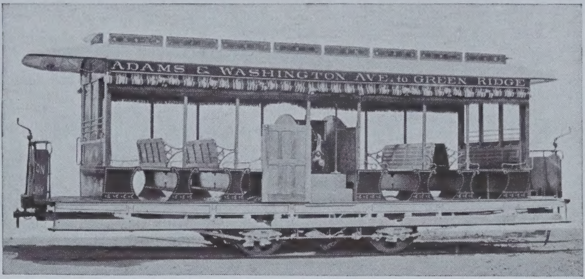
JAMES RAWLE

III

THESE reminiscences of the "res angustæ domi," the "narrow matters of home," are interesting to the writer and those immediately concerned. They were events and developments in an enterprise which started with small beginnings and has grown, a brick at a time, to proportions of some considerable magnitude.

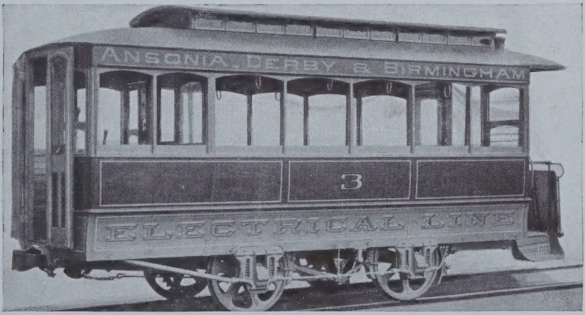
The development of electricity as a motive power for railway cars set in, after the first experiments, with a vigor rarely exampled in the using of Nature's forces; in fact, it marked a distinct epoch in the world's history. Somewhat strangely, it was not in the big cities of the United States that electric propulsion was first employed. In point of fact, there was an installation earlier than Leo Daft's, before referred to, which was promoted by the National Electric Railway System, and another for Ansonia,

Car for one of the earliest storage battery systems



The first electric car built at the Brill works was furnished in the latter part of 1886 to the Scranton Suburban Railway

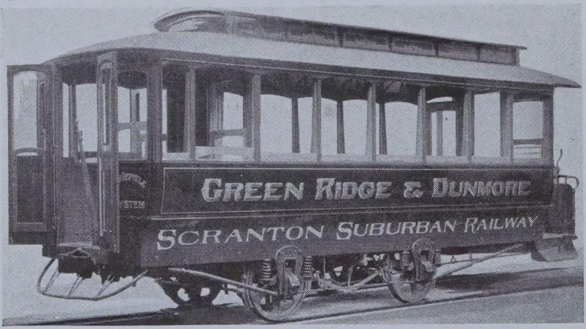
Conn. In the same year, 1887, one for Sprague for Harrisburg, and one for the same person for Baltimore. In 1888 and 1889 cars were furnished to the Sprague Electric Company for Atlantic City; The Electric Accumulator Company, Philadelphia; Sprague Electric Company for Wichita, Kan.; Evansville, Ind.; Eau Claire, Wis., Sprague System; Marlborough, Mass., Sprague System; Thomson-Houston Electric Company, Davenport; Sprague System, Davenport, Iowa; experimental car for Thomas A. Edison, Menlo Park, N. J.; Electro-Dynamic Company of Philadelphia, the predecessors of The Electric Storage Battery Company; Cleveland, Ohio, Thomson-Houston System; Quincy & Boston Street Railway; Kearney, Neb., Sprague System; Eckington & Soldiers' Home Railway, Washington, D. C.; Tacoma, Wash., Sprague System; Stillwater, Sprague System; Ogden, Utah; storage battery car for Electric Car Company of America; Ensley, Ala.; Binghamton, N. Y., Sprague System; Wilkes-Barre, Pa., Sprague System; West Bay City, Sprague System; Wilmington, Del.; Portland, Ore.; Pittsburgh, Sprague System; Dubuque, Iowa, Sprague System; Cleveland, Ohio, Sprague System; Tampa, Fla.; Chattanooga, Tenn.; Laredo, Texas, Sprague System; Barclay,



A Van Depoele motor car for Ansonia, Conn.

Sprague System; Durban, Africa; Denver, Col.; Pullman, Ill., Sprague System; Neversink Mountain Railway, Reading; Newburgh, N. Y.; Washington, Alexandria & Potomac Railway; and Sioux City Railroad. At this time a considerable order for cars for steam traction was furnished to Bogota, Colombia, the first railroad cars for that country, and a large order for the Mexican Transcontinental Line for the Ferrocarril Interoceanico was furnished, and a large order for Atlanta, Ga., Thomson-Houston System; another for Americus, Ga., Thomson-Houston System; and another for Saratoga, N. Y.

In 1889, a year of great floods, including the Johnstown flood, the expansion of the business impelled the Brill Company to move their works to larger surroundings. A tract of 37 acres had been secured at Bridesburg, Philadelphia, but it was deemed a disadvantage to be located at a place having but one transporting railway system, and accordingly a tract of 18 acres at the intersection of the Pennsylvania and the Baltimore & Ohio Railroads was secured and work immediately begun in building the shops of the present plant in the southwest part of Philadelphia. This work was energetically prosecuted, and in the spring of 1890 the moving of the machinery was begun. The workmen would work on a machine at the old plant up to noon of one day and the machine would be taken down, conveyed to the new location, three miles distant, set up and be working again on the next day. The pressure for cars and trucks to be supplied was great. [TO BE CONTINUED]



Closed cars for Scranton, Pa. Van Depoele motor on the front platform

THE J. G. BRILL COMPANY

Main Office: PHILADELPHIA, U. S. A.
Cable Address: "BRILL," Philadelphia

London Office: 110 Cannon Street, E. C.
Cable Address: "AXLES," London

American
Car Company
St. Louis, Mo.

G. C. Kuhlman
Car Company
Cleveland, Ohio

John Stephenson Company
Elizabeth, N. J.

Wason
Manufacturing Company
Springfield, Mass.

Danville
Car Company
Danville, Ill.

COMPAGNIE J. G. BRILL
14 Place de Laborde, Paris
Cable Address: "BOGIBRIL"

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San Francisco

Australasia
Noyes Brothers
Melbourne, Sidney,
Dunedin, Brisbane, Perth

Mexico
International Machinery &
Engineering Co.
Mutual Bldg., Mexico, D.F.

Belgium and Holland
C. Dubbelman
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Argentine and Uruguay
Federico H. Bagge
Calle San Martin 201
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Natal, Transvaal and
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China
Shewan, Tomes & Co.
Hong Kong, Canton
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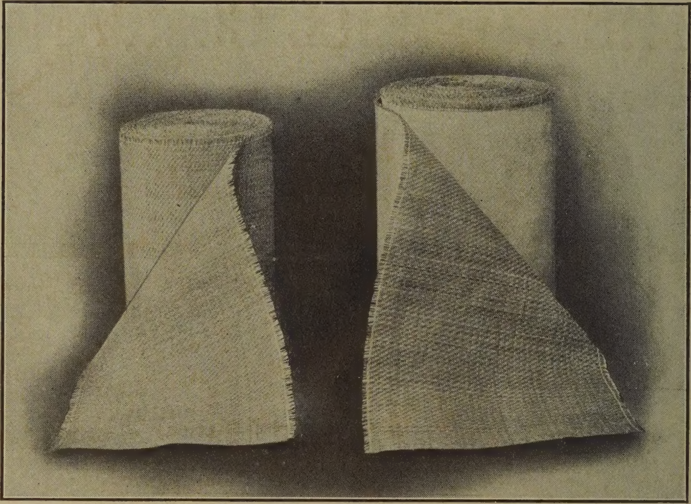

BRILL TWILL-WOVEN CANE

Canvas-lined woven cane for seat cushions and unlined woven cane for seat backs are made in all widths from 18 to 36 inches, even inches. The superior wearing qualities of Brill woven cane are due to the kind of cane used and to the improvements in looms and processes developed and perfected at the Brill plant. The cane used is selected for its hard silicate surface which doubles the life of the material over that made with ordinary cane

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA